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A Revision of the North American Species of Fissidens.*—II.

CHARLES R. BARNES.

12. F. polypodioides HEDWIG: Musc. Frond. 3. 63. t. 27.

Hypnum polypodioides SWARTZ: Prod. 140.

Fissidens polypodioides HEDWIG: Musc. Frond. 3. 63. t. 27.—Sp. Musc. 154.—BRIDEL: Musc. Recent. II. 1. 141.—Sp. Musc. 1. 168.—Mant. Musc. 189.—Bry. Univ. 2. 69[illegible]—BEAUVOIR: Prod. 57.—SCHWÆGRICHEN: Suppl. I. 2. 8.—MUELLER: Syn. Musc. 1. 52.—SULLIVANT: Mosses U. S. 25.—Proc. Amer. Acad. 5. 273.—Icon. Musc. 42. t. 27.—LESQ. & JAMES: Man. 88.—MITTEN: Jour. Linn. Soc. 21. 559.

COLL.: DRUMMOND: Musci Amer. II. no. 38.—SULL. & LESQ.: Musci Bor. Am. 1 ed. no. 87.—2 ed. no. 110.

Dicranum polypodioides SWARTZ: Fl. Ind. Occ. 3. 1772.

Skitophyllum polypodioides DE LA PYLAIE: Desv. Jour. Bot. 6. 153. t. 38. f. 10.[1]

Plants large, 2–5 cm., gregarious, yellowish-green: stems simple, rigid, rooting at base only, which is nearly bare: leaves numerous, scarcely imbricate, lance-oblong to linear-oblong, obtuse, entire or sub-denticulate near apex; border none; costa strong, barely reaching the apex; vaginant lamina ½–⅔ length; inferior lamina not narrowed, not at all or slightly decurrent, cells large, 16–24 μ, roundish, pellucid: flowers dioicous; the male in the lower axils; the female in the upper axils; archegonia numerous, without paraphyses: fruit sub-terminal; seta short, 1 cm. long, flexuous, reddish; capsule brown, obconic, much contracted under the large mouth when dry; teeth broad and long; operculum and thick sub-oblique beak equaling one half the length of capsule; annulus large, revoluble.

HAB.: Moist rocks: Louisiana (*Drummond*); Georgia (*Lesquereux*), sterile; West Florida (*Chapman*); Cuba (*Wright*).

13. F. subbasilaris HEDWIG: Sp. Musc. 155; t. 39. ff. 6–9.

MICHAUX: Fl. Bor. Am. 2. 299.—BRIDEL: Sp. Musc. 1. 169.—Mant. Musc. 189.—Bry. Univ. 2. 694.—SCHWÆGRICHEN: Suppl. I. 2. 10.—HAMPE: Linnæa 13. 45.—SULLIVANT: Mosses U. S. 25.—Icon. Musc. 41, t. 26.—MUELLER: Syn. Musc. 1. 50.—LESQ. & JAMES: Man. 88.—MITTEN: Jour. Linn. Soc. 21. 560.

COLL.: DRUMMOND: Musci Amer. I. no. 111.—II. no. 42.—SULLIVANT: Musci All. no. 184.—SULLIVANT and LESQUEREUX: Musci Bor. Am. 1 ed. no. 84.—2 ed. no. 107.—AUSTIN: Musci App. no. 105.

Skitophyllum subbasilare DE LA PYLAIE: Desv. Jour. Bot. 6. 168. t. 38. f. 11.

Plants small, 1–2 cm. high, densely and widely cespitose, green above, brown and tomentose below: stems simple or branched, erect: leaves 12–15 pairs, crisped when dry, oblong, obtuse with a single pointed cell at the apex, minutely crenate below, minutely and irregularly serrate above; border none; costa vanishing below the apex; vagi-

*Read before the A. A. A. S., Buffalo meeting, August, 1886.

[1]Frequent mistakes are made in citing these plates. They are correctly numbered, but by a typographical error incorrectly referred to by De la Pylaie. There is also confusion in the paging of this monograph.

nant lamina $\frac{2}{3}$–$\frac{3}{4}$ length; inferior lamina not tapering, ceasing before or at the base; cells small, 10–14 μ, roundish, densely chlorophyllose and very obscure: flowers dioicous?; female only known, arising near the base of the stem, rooting: fruit subbasal; seta short, equaling or somewhat exceeding the stems; capsule pale, cylindric-oval, erect, or slightly curved; conic operculum with its beak equaling half the capsule; calyptra slender, cucullate; spores 18–22 μ.

HAB.: On trees and rocks: Canada and states east of Mississippi river; St. Louis, Mo. (*Drummond*).

14. F. taxifolius HEDWIG: Sp. Musc. 135. t. 39.

BRAITHWAITE: Br. Moss-Fl. 1. 77. t. 12 A.—RICHARDSON: Append. 27.—SULLIVANT: Mosses U. S. 25.—JAMES: Trans. Am. Phil. Soc. 13. 109.—LESQ. & JAMES: Man. 87.—MITTEN: Jour. Linn. Soc. 21. 558.

COLL.: SULL. & LESQ.: Musci Bor. Am. 1 ed. no. 83.—2 ed. no. 106.—AUSTIN: Musci App. no. 107.

Plants of moderate size, 1–3 cm. high, gregarious, dark green: stems fasciculate branched at base, branches ascending or decumbent, radiculose: leaves numerous, closely approximate, sometimes slightly imbricate, crisped and incurved when dry, largest above the middle and decreasing toward the apex of stems, oblong-lanceolate, minutely serrulate, marginal cells often pellucid; border none; costa excurrent, broadening to form a strong mucro; vaginant lamina $\frac{1}{2}$ $\frac{2}{3}$ length; inferior lamina slightly narrowed to the base, not decurrent; cells hexagonal, 12–16 μ: flowers monoicous: male basal, on short rooting branches, antheridia 2 or 3, without paraphyses; female basal, axillary: fruit basal; seta 1–2 cm. long, flexuous, reddish-yellow; capsule oblong, thick, sub turgid, cernuous, or when empty pendent and contracted below the mouth, dark brown; operculum with a long slender beak commonly bent near the base; calyptra cucullate; spores 18–22 μ.

HAB.: Shaded clayey ground: Canada and states east of Mississippi river; southern Missouri (*Engelmann*).

15. F. Floridanus LESQ. & JAMES: Proc. Amer. Acad. 14. 137.

Manual 83.—MITTEN: Jour. Linn. Soc. 21. 556.

Plants 1–3 cm. high, brown below, bright green above: stems sparingly branched from the base: leaves densely crowded, the upper larger, long cultriform; apex minutely erose-denticulate, otherwise entire; border broad, pale; costa strong, vanishing a little below the apex; vaginant lamina more than $\frac{1}{2}$ length; inferior lamina ceasing abruptly at the base; cells minute, hexagonal: flowers monoicous; the male terminal on somewhat elongated lateral branches; the female axillary near the middle of the stem: fruit on a short branch rooting at base, single (rarely two from the same stem); seta 10–15 mm. long, thick, reddish; capsule oblong-oval, cernuous; operculum large, long-beaked.

HAB.: Florida (*Garber*).

16. F. decipiens DE NOTARIS: Epil. Bry. Ital. 479.

BRAITHWAITE: Br. Moss-Fl. 1. 76. t. 11 D.—LESQ. & JAMES: Manual 87.
F. adiantoides MITTEN: Jour. Linn. Soc. 21. 559, *not Hedwig!*
COLL: DRUMMOND: Musci Amer. I. no. 110.—II. no. 41, as var. *marginatus* of the next.—SULLIVANT: Musci All. no. 178.—SULL. & LESQ.: Musci Bor. Am. 1 ed. no. 85.

Plants of medium size, 1–3 cm. high, dusky green, gregarious: stems simple or branched at base: leaves as in *F. adiantoides* but closely imbricate; border 4 or 5 cells wide, usually very distinct, pellucid; cells small and indistinct, 8–12×8–16 μ: flowers dioicous, on plants in different tufts; the male axillary, gemmiform; female terminal: fruit as in *F. adiantoides*, but seta short, not much exceeding the stems, and spores 16–24 μ, mostly 20 μ.

HAB.: On sandy soil and rocks; common in Canada and the Eastern States: Columbia river (*Drummond*).

17. F. adiantoides HEDWIG: Musc. Frond. 3. 61. t. 26.

BRAITHWAITE: Br. Moss-Fl. 1. 78. t. 12 B.—MITTEN: Jour. Linn. Soc. 8. 29.—LESQUEREUX: Mem. Cal. Acad. 1. 8.—LESQ. & JAMES: Man. 88.
COLL: AUSTIN: Musci App. no. 106.
F. majus MITTEN: Jour. Linn. Soc. 21. 559.

Plants medium or large, 2–10 cm. high, gregarious: stems erect, branching above or below, branches rooting: leaves numerous, imbricate at base, oblong-lanceolate, abruptly acuminate, minutely and regularly serrulate, becoming irregularly serrate with large and small teeth towards the apex; border none (var. *immarginatus*) or of two or three rows of thick-walled, more or less pellucid cells; vaginant lamina $\frac{1}{2}$ length or more; inferior lamina reaching the base; vertical lamina crisped at tip when dry; cells large, roundish-hexagonal, distinct, 16–20 μ, 24–32 μ in sterile shoots: flowers monoicous, short-stalked near the middle of stems; the male gemmiform, below the female: fruits median, 1– several on the same stem; seta 1–2.5 cm. long, yellowish-red, flexuous; capsule oblong, yellowish or dark red, much narrowed under the orifice when empty; operculum and long more or less oblique beak equaling the capsule; spores 22–24 μ.

HAB.: Shady, moist places; common in Canada and Eastern States; Fort Colville (*Lyall*); California.

18. F. grandifrons BRIDEL: Sp. Musc. 1. 170.

BRIDEL: Mant. Musc. 191.—SCHWÆGRICHEN: Suppl. I. 2. 11.—BRUCH & SCHIMPER: Bry. Eu. Fiss. Monog. 11. t. 106.—SULLIVANT: Mosses of U. S. 25.—MUELLER: Syn. Musc. 1. 46.—SCHIMPER: Syn. Musc. 1 ed. 110.—2 ed. 121.—LESQUEREUX: Mem. Cal. Acad. 1. 8.—BOLANDER: Cat. 37.—WATSON: Bot. Calif. 2. 374.—MITTEN: Jour. Linn. Soc. 8. 29.—l. c. 21. 559.—LESQ. & JAMES: Man. 89.
COLL: SULLIVANT: Musci All. no. 186.—SULL. & LESQ.: Musci Bor. Am. 1 ed. no. 88.—2 ed. no. 111.—AUSTIN: Musci App. Suppl. no. 483.
Skitophyllum congestum DE LA PYLAIE: Desv. Jour. Bot. 6. 164. t. 39. f. 16.
[*Fissidens subgrandifrons* MUELLER: Bot. Zeit. 22. 359.
Fissidens insignis SCHIMPER (*in herb.* HAMPE): Bot. Zeit. l. c.
Fissidens strictus SCHIMPER.—*Fide* MITTEN: Jour. Linn. Soc. 21. 559.]

Plants of variable size, but usually very large, 3-15 cm. high, dark green, gregarious or cespitulose: stems pale, fasciculately branched at base, branches simple or again branched, rigid: leaves numerous, all equal, thick, rigid, linear-lanceolate, entire: border none; costa thick, pellucid, vanishing just within the apex; vaginant lamina more than ½ length; inferior lamina not narrowed; cells in several layers, small, 12-16 μ: flowers axillary; archegonia numerous: fruit lateral, from the upper axils; seta long; capsule erect or oblique, oblong, dark red-brown; teeth inserted far within the edge, deeply cleft, very broad at the irregular and sparsely perforate base, closely articulate, the divisions subulate, rough; operculum conic rostrate, beak short, often oblique; spores somewhat oval, 20-28×28-32 μ.

HAB.: On submerged or wet rocks: New York Chittenango Falls (*Barron*), Syracuse (*Rust, Cook*), Caledonia creek (*Clinton*), Niagara Falls; Owen Sound, Canada (*Macoun, Roy*); Ohio (*Sullivant*); Illinois (*Wolf, Brendel*); south eastern Missouri (*Wolf*); Ruby Valley, Nevada (*Watson*); California (*Bigelow, Bolander, Roy*).

19. F. Julianus SCHIMPER: Flora 21. 271.

MUELLER: Syn. Musc. 1. 44.—MITTEN: Jour. Linn. Soc. 21. 560.

Fontinalis Juliana SAVI: Fl. Pis. 2. 114.[1]—DE CANDOLLE: Fl. Franç. 6. 236.—POLLICH Fl. Veron. 3. 385.—DUBY: Bot. Gall. 554.

Skitophyllum fontanum DE LA PYLAIE: Desv. Jour. Bot. 6. 158 t. 34. 2.

Octodiceras Julianum BRIDEL: Bry. Univ. 2. 678.—BRUCH & SCHIMPER: Bry. Eu. Oct. Monog. 4. t. 108.

Conomitrium Julianum MONTAGNE: Ann. Sci. Nat. II. 8. 246. t. 4.—MUELLER: Syn. Musc. 2. 524.—SCHIMPER: Bry. Eu. Corol. 22.—Syn. Musc. 1 ed. 111.—2 ed. 122.—SULLIVANT: Mosses U. S. 25.—PECK: 19th Rept. 46.—LESQ. & JAMES: Man. 89.

COLL.: SULL. & LESQ.: Musci Bor. Am. 1 ed. no. 89.—2 ed. no. 112.—AUSTIN: Musc App. no. 187.

Fissidens Dillenii HAMPE: Linnæa 13. 45.

Plants large, slender, 5–15 cm. long, floating, the older parts blackish-green: stems filiform, branching by innovations along their whole length: leaves numerous, remote, linear-lanceolate, entire; border none; costa vanishing at some distance from the apex; vaginant lamina ¼ length; inferior lamina not reaching the base; cells irregular, hexagonal, inclining to quadrate below, 16–20×20–32 μ: flowers monoicous, terminating very short axillary branches; the male sometimes clustered, antheridia 2–3; the female rarely on elongated branches, archegonia 3–5, vertical lamina of perichætial leaves ceasing just below apex of vaginant lamina: fruit cladogenous, often numerous; seta shorter than the capsule, fragile at base, pale; capsule elliptical, pale, red at mouth; teeth short, premorse, irregularly cleft and perforate above the middle, yellowish, pellucid; operculum conic-rostrate, together with its blunt beak equaling the capsule; calyptra conic, nearly black, cleft or erose at base, covering only the beak; spores 20–24 μ.

[1] This reference I have not been able to verify. The page is quoted by De Candolle as 414.

HAB.: On wood and stones in streams and swamps: Rhode Island (*Bennett*); Hampden, Conn. (*Eaton*); Shawangunk Mts, N. Y., Northern N. J. (*Austin*); Smoke's creek, N. Y. (*Clinton*); Columbus, O. (*Sullivant*): Santee Canal, S. C. (*Ravenel*); Savannah river (*Beyrich*); Roseville, Fla. (*Austin*); Rocky Mts. and California (*Hall*).

20. F. Hallianus MITTEN: Jour. Linn. Soc. 21. 560.

Conomitrium Hallianum SULL. & LESQ.: Austin's Musci App. no. 108.—SULLIVANT: Icon. Musc. Suppl. 43. t. 28.—LESQ. & JAMES: Man. 90.

Plants small, slender, 1–3 cm. long, in small, dirty-green tufts: stems filiform, fasciculately branched at base: leaves remote, numerous, narrowly linear-lanceolate; inferior lamina descending almost or quite to the base; cells 16–24 μ; otherwise as in the preceding: flowers monoicous, terminal on rather elongated, leafy branches: fruit cladogenous: seta once and a half or twice as long as the capsule, pale; capsule oblong-elliptical, pale; teeth undivided, lance-subulate, reddish; distantly articulate, papillose, inserted below the edge; operculum conic-rostrate, together with its acute beak shorter than the capsule; calyptra cucullate, covering entire operculum; spores 18–24 μ.

HAB.: On wood and stones in swamps and rivulets, places wet by spray, and old wells: Athens, Ills. (*Hall*); Little Falls and Ogdensburgh, N. J., and Herkimer county, N. Y. (*Austin*); Caloosa, Fla. (*J. Donnell Smith*).

REMARKS.

F. bryoides.—The teeth in this species and its congeners are somewhat spirally roughened above. The stems bearing their first fruit do not bear any male flowers: at the second fruiting the male flowers are abundant in the axils of the older leaves.

F. bryoides, var. **cæspitans.**—I have seen no American specimens of this variety.[1] The rufous purple rhizoids and pale color are its most striking characters. These differences, together with the robust habit, are just such as we should expect on transferring the species to wet places, and do not seem to me sufficient basis for the new species proposed by Mitten.

F. Closteri.—"The plants are always surrounded by brown patches of protonema, the color of which and general appearance is characteristic."—Austin, *fide* E. A. Rau *in lit.*[2]

[1] Mr. Allen writes: "We collected it (with very immature fruit) on the stream which comes down from Boott's spur, * * * just south of the stream from Tuckerman's Ravine." The specimens sent to James can not now be found in his herbarium, nor can Prof. O. D. Allen find his own.

[2] ERRATUM.—Page 5, line 4: for "on the ground" read *on rocks along rivulets.*—E. A. RAU.

F. incurvus.—Braithwaite cites "Starke MSS." as authority for this name. But Schwægrichen first *published* it in 1811. From his plate, which has in this part no explanatory text, Röhling took up the name in Deutschl. Fl. 3. 76 (1813). The papillæ of the teeth in F. incurvus and its allies are not arranged spirally as in the bryoides group, but are irregularly distributed.

This species has two distinct forms which differ chiefly in the capsule. The typical form has an arcuate capsule, while the f. *erectus* has the capsule erect. The latter is especially abundant in the James herb. from all parts of the middle Atlantic States. The variety *minutulus*, in its typical form, is readily distinguished by its small size and narrow, wavy-edged leaves. It passes insensibly however on the one hand into the variety *exiguus*, and on the other into true *incurvus*. The inflorescence in the whole group is variable and can not be depended upon for specific distinctions.[1] In specimens of *minutulus* from Oakland, Md., I have found the old plants innovating from the upper axils. These innovations are the male and female stems, and arise side by side from the same point with their rhizoids interlaced. In other specimens the male was found attached to the female exactly as in typical *incurvus*. In some of these specimens the leaves are margined, in others they are immarginate, and in others still some leaves are margined, and some not, apparently as it happened.

F. Garberi.—I have examined many flowers of this species, but have found none with antheridia. I therefore alter the description of the flowers to conform to Austin's investigations and my own.

F. Donnellii.—This plant has been collected but once, without capsules, and ought probably to be referred to *F. subcrenatus* of Schimper, a Mexican species, from which its known characters differ only by the less number (by one pair) and greater narrowness of the leaves. The larger cells and the distinct serration of the leaves are obvious distinctions from F. Garberi, to which it is closely allied.

F. obtusifolius.[2]—"Specimens from Texas appear to be pseudo-monoicous, *i. e.*, a branch with a terminal male flower is at first attached to the female stem, and afterward becomes independent, rooting at base."—*Mss. note in herb. Sullivant.*

[1] Cf. Braithwaite: Br. Moss-Fl. i. 66.

[2] To habitat on page 7 add: Colorado (*Brandegee*) *fide* Rau.

F. rufulus.—The upper leaves are usually much abraded; of some, the thick borders and costa alone remain.

F. Floridanus.—This species has been severely criticized by Austin,[1] and no specimens of it are extant in this country.

F. decipiens and **F. adiantoides.**—I can not agree with Mitten[2] in changing the application of Hedwig's name. The characters which distinguish *adiantoides* from *decipiens* are stature, size of leaf-cells, character of leaf-border, monoicism and habitat. Of these Hedwig mentions but one, and that one about which it was easy to be mistaken by reason of the scarcity of male flowers. If indeed he had both specimens he merely confused them (as many subsequent writers did), as is shown by his citing Dillenian and Linnæan figures and descriptions of the palustral species under his description, "*fœmineus itidem alaris proprii individui.*" As the only Hedwigian character is somewhat in doubt, it seems unwise and unnecessary to introduce confusion by transferring Hedwig's name from a plant with which it has been associated for a century to a plant which it is possible, but not proved, that he meant.

F. grandifrons.—The description of the fruit is supplied from Himalayan specimens collected by Falconer.

DOUBTFUL OR EXCLUDED SPECIES.

F. impar Mitten: Jour. Linn. Soc. 21. 554.—*F. bryoides* Drummond: Musci Am. No. 113 in part.

"Similar to small F. bryoides, but with more oblong leaves, having shorter and wider points, the inferior edge of the vertical lamina not continued to the base, mostly only half way; limb very narrow or almost obsolete on the vertical lamina; capsule oval or oblong; male flowers bud-like, very minute.

"Canada, Prof. Macoun."

I have examined this plant in Drummond's collection, in which it is recognizable. I have not been able to find it, however, in collections kindly loaned by Prof. Macoun. It seems to me to be only depauperate F. bryoides.

F. inconstans Schimper.—This form seems to be a mere sport of F. incurvus, dependent on the decaying or not of the older stems. To the latter species it is reduced.

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[1]Bull. Torr. Bot. Club, vii. 6.
[2]Jour. Linn. Soc. xxi. 559.

F. synoicus Sullivant: Mosses U. S. p. 103.—Referred by Lesquereux and James to F. inconstans, must be reduced to F. incurvus. The variability of the inflorescence seems to be only a sport as in F. inconstans. It is nearest the var. minutulus.

F. Hallii Austin: Bot. Gaz. 2. 97.—Lesq. and James: Man. 85.—Mitten: Jour. Linn. Soc. 21. 558.

"Size and facies of F. incurvus, from which it is distinguished by the crenulate leaves without a border, the (always?) longer-beaked operculum, the calyptra not cleft and descending scarcely to the base of the beak, etc.—Capsule erect, pedicel moderately long, inflorescence dioicous, plants of both sexes growing together.—Texas, *Hall*."

The above characters are, in the *incurvus* group, wholly insufficient. The scanty diagnosis does not permit it to be referred with certainty to any species. It is probably F. incurvus, var. exiguus. In case it proves, on further collection, to be a good species, it should be called *F. Austini*, as the present name is too near F. Hallianus.

F. Texanus Lesquereux: Lesq. & James Man. 86.—Mitten: Jour. Linn. Soc. 21. 556.

"Plants dark green, turning to black: leaves 5–7 pairs, curved at the apex, broadly lanceolate-acuminate, with a thick dark smooth margin ascending to the apex or to near the slightly serrulate point: costa stout, percurrent or excurrent into a short mucro; dorsal lamina broad, descending to the base: male and female plants similar: capsule long-pedicellate, oval, inclined, rarely erect, greenish brown, smooth; lid conical, short-beaked, subincurved.—Herb. Sulliv. 1850. Texas (*Wright*)."

Neither MSS. nor specimens can now be found in the Sullivant herbarium, and the meager description indicates too close affinity with F. incurvus, and it can hardly be doubted that it is referable to this polymorphous species. The remark of Lesq. & James that "it differs from F. Hallii merely in the entire margined leaves" also indicates that it is not a true species.

F. crassipes Wilson.—No American specimens are known.

Flora near Santa Barbara, Cal.

MRS. R. F. BINGHAM.

The vicinity of Santa Barbara, California, is one of the most favored for botanizing, for although we seldom have rain from May to November, there is no time in the year when a search will not be rewarded by something of interest.

An enthusiastic collector can, in a very short time, pick up a goodly number of plants, along the roadside, in the mountain cañons, on the hills and mountains, on the banks of streams, in the dry beds of streams (after the rains are over), in swamps, on the cliffs, and in the sand near the sea, in still water, and in the ocean.

Not only are flowering plants abundant, but many cryptogams can be obtained. Several beautiful ferns are natives here. During the rainy season many species of mosses can be collected, and a few can be found in favorable locations all the year.

Fresh-water algæ can be found in our streams, and this part of the coast is noted for the abundance and beauty of marine algæ, upon which are many forms of diatoms. Those who are interested in lichens and fungi need have no trouble in finding them.

As the result of several years botanizing here (the greater part of which was done in the years 1877, 1878 and 1882), I have collected about 500 species of phanerogams, twenty species of Musci, over 100 of marine algæ, several parasitic fungi, besides ferns, equisetums, Selaginella, Chara, Azolla, Marsilia, and some other cryptogams.

If a person wishes to know the flora of even a limited area, it must be visited often during the year, and for more than one year. The flora changes with the season; while there are many perennials that are always in bloom, there are many plants that bloom and disappear, or cease blooming, and others take their places, so that several species of plants may occupy the same ground during the same year.

Plants that are abundant one year do not always appear the next year, or in succeeding years. This fact may be one reason why botanists visiting a certain locality, may find plants that some previous or succeeding visitor has failed to find.

Each plant seems to know its own season for appearing.

I have often noticed that when the rains were late, many species which can be found when we have early rains do not appear at all, and some later plants do not appear when we have only early rains.

During the present year we had both early and late rains in large quantity, and it has been very favorable for botanizing. Not since 1874 has the flora been so abundant and so perfect. I have found several species in large quantity that I had not seen, except occasional specimens, since 1878. In some places that I had looked over pretty thoroughly in previous years, I have found plants that I had never seen before. I have added over thirty species to my collection that I had not before obtained.

Many plants have been introduced here both from semi-tropical and temperate latitudes, and several have escaped from cultivation.

Many of our native plants are beautiful and have been cultivated in gardens in this country and Europe. Many less attractive plants are nevertheless very interesting. My attention has been especially called to some plants of the order Naiadaceæ, which are found in the sea, growing upon small rocks near low tide marks. When the tides run very low these plants are uncovered, but at the time of blooming the tides are not very low in the daylight, and they can not be seen, yet the water is not deep enough to enable one to collect by means of boats. The only way to obtain it is to search carefully when it is washed ashore.

The leaves are bright green, long, very slender, and one nerved. The blossoms are diœcious, arranged in two vertical rows on the face of a spadix, which is enclosed in the dilated base of a leaf-like spathe. Within the margin, on each side, is a series of short dilated foliaceous appendages. These appendages cover the blossoms, and in the staminate plant are reflexed at maturity; in fruit the base of the nutlets is covered by the appendages.

Imperfect specimens of this plant were collected here by Dr. Torrey, and it was described under the name of Phyllospadix Torreyi, but the staminate blossoms were unknown until 1881, when I succeeded in finding both forms of the plant, and from those specimens the generic characters of the plant were established. The plant is washed ashore throughout the year, frequently in large quantities; it blooms in July and August, and the pistillate plant is sometimes abundant, the staminate blossoms are rare, and require careful search to obtain.

Although I have obtained a good many specimens, I do not know of any being found here by any one else, and I do not think it has been found in bloom elsewhere on the coast, although botanists have searched for it in many localities.

There is another species, Phyllospadix Scouleri, that was collected in imperfect specimens at Vancouver, and at the mouth of Russian river, but had never been found south of there, or indeed anywhere for several years, until this year, my husband, who is my associate in all my collecting, and without whose untiring assistance I could accomplish but little in field work, has found a specimen with pistillate blossoms. The leaves of this plant are broader than those of P. Torreyi, ribbon-like and three-nerved; the peduncles are short and with a single spathe.

Our Zostera is somewhat different from that of the Atlantic coast, the leaves nearly one-half inch wide and ten to thirteen nerved; the fruit is also larger than the eastern form. California is a land of large products, which may in some measure explain this fact; but our plant is considered a new variety by Rev. Thomas Morong, who describes it under the name Zostera marina, var. latifolia.

Strasburger's Laboratory.

DOUGLAS H. CAMPBELL.

The laboratory is not at all pretentious, and is fitted up in the plainest possible manner. In company with the zoological and palæontological laboratories, it occupies an old building known as the "Poppelsdorfer-Schloss," originally the dwelling of some dignitary or other, and not specially adapted to its present purpose. It is a large square building, enclosing a central circular court, around which a gallery, level with the second story, is built, by means of which access is had to the various rooms.

The building is finely situated at the head of a magnificent double avenue of horse-chestnuts, some half-mile in length, which forms the favorite promenade of the citizens of Bonn. Three sides of the building are included in the botanical garden, which is a very good one.

In the garden there is a very good collection of hardy plants, and besides some half-dozen green-houses and con-

servatories containing a large and varied collection of tender plants. Among these is a large palm-house containing some very fine examples, and a smaller circular building, in which beautiful specimens of the Victoria regia and other water-lilies were blooming when I first arrived. These have all been removed, however, to make room for other plants.

One of the smaller houses is devoted principally to orchids; the contents of the others are of a more miscellaneous character. Thus it can be seen that there is abundant material for work.

The laboratory itself consists of a series of small rooms, two of which Professor Strasburger uses as his own laboratory and study, and a large one which is occupied by the classes engaged in general work. This latter is at present closed, as the work of the more elementary classes is carried on for the most part during the summer semester.

The laboratory appliances are for the most part of a very simple description, except in the matter of reagents, of which there seems to be an endless variety; but of physiological apparatus there is very little—at least, visible.

Professor Strasburger is an extremely satisfactory teacher. There are so few of us in the laboratory at present that he has time to follow our work closely, and is always ready with helpful suggestions.

One has but to look at him to see that he is a man engrossed heart and soul in his work. He is a man of about forty-three years of age, though looking somewhat older; of medium height, very thin, and with peculiarly strongly marked aquiline features. His whole appearance is indicative of overwork.

As a lecturer he is clear and concise, but the course of lectures that I have been hearing has been chiefly, so far, on a not very interesting subject to me—methods of bacteria culture—and so I can hardly claim to have heard him at his best.

His assistant, Dr. Johow, is a much younger man, and, to judge from what I saw of his work, an able one. He spent about a year in the West Indies with Schimper, who is probably now on his way here from Brazil. I believe he is expected here about the first of January, and will give some lectures this semester.

Of course, my principal object in coming here was to get hold of some of Strasburger's methods, and as he is very obliging, and ready to give help, my hopes have been fully

realized. It is one thing to read directions about making a preparation, and another to have all the steps explained minutely by one who is thoroughly versed in the subject. If anything is wrong, it is so much easier to be told where the trouble is than to have to make it out for one's self!

Some time ago I had an opportunity of examining some of Strasburger's own preparations of nuclear-division. They were from the embryo-sacs of Fritillaria and Galanthus and were stained with sopranin. It would be impossible to imagine anything more definite and clearly colored. I had not supposed it possible to fix and stain anything so perfectly.

From what I have said, you can easily see that I feel fully repaid for coming here.

Chippeway Plant Names.

L. H. BAILEY, JR.

During a recent visit to the extreme northern portion of Minnesota, under the auspices of the Geological and Natural History Survey of that State, I had occasion to acquire some of the plant names of the Chippeways. These names were obtained from two men—Pasheton'egweb and Mimash'gawab—who could speak tolerable English. In accordance with custom in writing Indian names, I have employed *e* for the first sound of *a*. In the middle of a syllable this sound of *e* is much shortened; *i* usually has the sound of *e*; *g* and *k* are interchangeable, the sound which they represent being nearly a medium between them, and often partaking also of the sound of *n*. *Ngk* often represents very nearly the sound represented by *g* or *k*. *Ans*, a pure French-like nasal with the sound of *s* retained, is a diminutive; *min'nis*, island, *min'nisans*, little island; *sag'ime*, mosquito, *sag'imans*, little mosquito ("sand fly").

Anibi'shan, Plantago major. This word appears to be used also to designate leaf or foliage in general.

Shin'kwag (pl. *shinkwa'kwag*), Pine. Appears to be applied to both Pinus resinosa and P. Strobus.

Wi'gob, Tilia Americana. We find *b* here has much the sound of *p*.

Wi'kwas, Betula papyracea.

Mitig'omish, Quercus macrocarpa.

Bima'tig, Vine.

Wi'kwas bima'tig, Celastrus scandens, literally "birch vine," from its frequent occurrence on the birch.

Manito' bima'tig, Ampelopsis quinquefolia, "spirit vine," from medicinal properties of its roots.

Ki'shig, Thuja occidentalis.

Mi'nan, Vaccinium berries. This word appears to be used also for berry in general. As near as I could learn, it is the plural form of the word, the singular being *wim'in*.

Wabo'so-minan, "rabbit berry," Aralia nudicaule.

Migi'si wimin, "eagle berry," Physalis grandiflora.

Asa'sa-wimin, Prunus Virginiana.

Shasha'go-minan, Cornus Canadensis.

Ote'imin (pl. *ote'iminin*), Strawberry. Evidently applied to fruit of both Fragaria Virginiana and F. vesca.

Manito'katag, "spirit root," Cicuta maculata.

Wan'pekoon, Epilobium spicatum.

Gitchik' amiwashg, Scirpus lacustris and the large Eleocharis palustris, growing in borders of lakes.

Anikawashg'ans, "little joints," Equisetum limosum, growing in lakes.

Assak'anashg, Phragmites communis.

Abakwai', Typha latifolia.

Ansis', well defined masses of Potamogetons growing in water.

Ansisi', various water weeds along the margins of lakes and rivers.

Wabizi' binawatig, Sagittaria variabilis, var. gracilis.

Wabishka biqua'kwat, "white ball," Nymphæa tuberosa.

Bigna'kwatans, "little ball," leaves of Nuphar advena and N. Kalmianum. It would seem that this name should be applied to the flowers, but repeated questioning only supported this application.

Ogito'bag, flower of Nuphar Kalmianum, and perhaps also of N. advena.

Wiken', Acorus Calamus.

Name'bin, Asarum Canadense.

Mash'gig, "mushkeg" of the settlers, a sphagnous swamp.

Mashgikwam'odash, "swamp bag or pouch," Sarracenia purpurea.

Bashginakwa'nibagon, Lycopodium complanatum, L. clavatum, and probably other lycopods.

Wishashkwa'tan, Mushroom.

Kine'bigobag, Fern. *Kene'big* is snake. I could not determine the significance of the remainder of the word.

Winnisi'bag, Chimaphila umbellata.

Oshabo'minag, fruit of Ribes hirtellum.

Oshabo'minagansh, bush of Ribes hirtellum.

Mine'sag, fruit of Cratægus.

Osikwa'gomish, fruit of Amelanchier.

Osikwa'gominag, bush of same.

Tchatchamo'sikan, Achillea millefolium.

Miskwim'inag, fruit of Rubus strigosus.

Miskwim'inakash, bush of same.

Ashkashkata'minakwai, Clintonia borealis.

Bashgisikana'gominan, berries of Sambucus racemosa. Pashetonegweb told me of edible and darker colored berries of the same name, evidently the fruit of S. Canadensis, but I did not see the plant there. *Bashgisikan* is gun; *minan*, berries. The intermediate syllables I can not account for. The name refers to the practice of making pop guns from elder stems.

Babashgisikana'tig, bush of elder.

Kakagiwan'tag, Taxus Canadensis.

Pukan', Corylus rostrata.

Miskwa'bimag, Cornus stolonifera.

Osa'kitigomag, Echinospermum sp.

Ni'ga-wimmin, "goose berry," Lonicera oblongifolia.

Shi'gak-minan, "skunk berry," fruit of Ribes floridum. Mimashgawab informed me that there is a red berry of the same name, evidently the fruit of R. prostratum, which occurs there.

Mishshitch'i-minan, fruit of Ribes rubrum.

I could not find names for Lysimachia stricta, Actæa alba, Chenopodium album and hybridum, or the Ashes.

BRIEFER ARTICLES.

New form of Baptisia calycosa.—I wish to call attention to a plant in the last distribution of that excellent collector, Mr. A. H. Curtiss, of Jacksonville, Florida. It is his No. 699*, and is sent out under the name of *Baptisia calycosa* Canby. The specimens which I have seen are, however, quite different in appearance from those originally collected by Miss Reynolds and Miss Floyd in the vicinity of St. Augustine. As in most species of the genus, these were very smooth or even glaucous, the only pubescence being a sparse and often deciduous fringing of the stipules, leaves and calyx, with long white hairs. In Mr. Curtiss's specimens the stems, branches and under side of the leaves (and also their margins and midrib above) are densely covered with a spreading or retrorse villosity which is still more strongly marked at each node of the stems. Apparently they retain their color in drying to some extent, while the type specimens always appear quite black. Mr. Curtiss's locality is at DeFuniak Springs, Wilson county, N. W. Florida, and as this must be about 300 miles from St. Augustine, it is possible that intermediate forms may occur; if these do not turn up a varietal name will be necessary, and the plant in view may be designated as Baptisia calycosa, var. villosa.—Wm. M. Canby.

Fixing and Staining Nuclei.—The following methods have been found to give excellent results in the study of nuclei. The observations were chiefly made with the mother-cells of the spermatozoids of various ferns, but the nuclei of vegetative cells also gave very instructive preparations. In order to fix the nuclei, the prothallia were placed in aqueous solutions of chromic or picric acid or corrosive sublimate. The chromic acid solution should be a 1 per cent. solution; the others concentrated. In these solutions they should remain from one to two hours, though in the corrosive sublimate solution less time is required. The chromic and picric acid preparations must be washed in several waters before staining. It has been found a good plan to leave them over night in abundant fresh water before the final washing.

The sublimate preparations may be transferred to absolute alcohol, in which they should remain several hours.

The specimens are now ready for staining. The best results were obtained with hæmatoxylin and gold chloride. The secret of good hæmatoxylin staining is to use a very dilute solution—three or four drops of the prepared solution in a watch-glass full of distilled water—and to allow the specimens to remain in this for at least twenty-four hours. Strasburger is especially emphatic upon these points.

After taking the specimens from the hæmatoxylin solution, they must be passed successively through 50 per cent., 70 per cent. and absolute alcohol before mounting. Half an hour is usually sufficient for each of the alcohols. For immediate examination they may be mounted in glycerine, but for permanent preparations first in origanum oil, and then transferred to Canada balsam (dissolved in chloroform).

The gold chloride method is simpler, and I have found it to answer admirably for specimens fixed in picric or chromic acid; but with those fixed with corrosive sublimate or alcohol it has not answered so well.

A few drops of 1 per cent. gold chloride in water are placed in a watch glass almost half filled with distilled water, and the specimens are allowed to remain from one-half to one hour, the solution being kept in the dark. Strasburger recommends a trace of HCl, but with the picric and chromic acid preparations, although thoroughly washed, I found this unnecessary. The specimens are then thoroughly washed, being at the same time exposed to the light and finally mounted in glycerine. With alcoholic material hæmatoxylin was found to give the best results.

The above notes embody nothing especially new, but may be useful as a memorandum of work actually done.—DOUGLAS H. CAMPBELL, *Bonn*.

A Useful Artificial Light.—The following apparatus, recommended by Strasburger, has been found very useful in dark weather, and of course can be used at night: A glass globe about six inches in diameter is filled with a very dilute solution of ammoniated copper oxide, and suspended between a large Argand burner (gas or oil) and the microscope. The

light should be about twenty inches from the microscope, and the globe sufficiently supported so as not to oscillate. The light obtained is bright but not dazzling, and of a soft green color that is extremely agreeable to the eyes. A screen of some kind should be used to protect the eyes from the light and heat of the lamp or gas flame used. The apparatus is referred to in the "Botanische Practicum" as the *Schuster Kugel*.—D. H. CAMPBELL, *Bonn*.

The influence of heredity upon vigor.—The results of two series of experiments with the tomato plant, carried on during the past three seasons, furnish a forcible illustration of the influence of the health of the parents upon progeny in plants.

In the fall of 1883 a single plant was noticed in a row of tomatoes that appeared more feeble, and had more of its fruits decayed than any other. A few seeds were gathered from some of the sound fruits of this feeble plant, and at the same time, a few from sound fruits on a neighboring plant that appeared healthy and vigorous. The following spring the two samples of seeds were sown, and the young plants transplanted to adjoining rows in the garden. It was a surprise to find that in habit the plants of each row closely resembled the parents, *i. e.*, the progeny of the feeble plant was also feeble, even more so than was the parent, while that of the vigorous plant appeared entirely healthy. The difference in the two rows was so marked that, but for the unquestionable identity of the fruit, one would scarcely have thought it possible that they could be of the same variety. The same selections of seed were continued through 1885 and 1886, with like results. The past season the progeny of the feeble plant of 1883 scarcely exceeded one-fourth the size of that of the vigorous one. The plants lay prostrate on the ground, with discolored and shriveled foliage, and with the fruits fully one-half decayed before frost came. This decay is a soft rot, quite different from the black rot that so often affects tomatoes. The fruit becomes soft and collapses without changing color, the skin finally bursts, permitting the contents to flow out, when the skin dries without detaching itself from the plant.

In the second series of experiments plants were grown through three successive generations from seed taken from quite immature fruits. In one instance seeds were gathered in every case from fruits that had not commenced to change color toward ripeness; in the other they were taken from entirely ripe fruits. It is of interest to observe that the effect of the immature seed upon the vigor of the progeny was precisely similar to that of the seeds from the enfeebled plant above noted. The plants grew more and more feeble, until they failed to attain more than a fourth the size of those grown from ripe fruit.

Several varieties of tomatoes now cultivated show evidences in their manner of growth of having been originated by the selection of too imma-

ture seed. This course may have been taken to secure earliness. Practical deductions, however, may be left for the cultivator; present interest centers more especially in the fact, illustrated by the experiments, that the hereditary law of the transmission of vigor holds as strongly in the vegetable as in the animal kingdom.—EMMETT S. GOFF.

Petroleum Spirit as a Plant Preservative.—If petroleum spirit (boiling from 25°–45°C.) has not been employed for preserving plants intended for the study of chemical constituents, I should like to propose it.

Plants for macro-chemical work are usually preserved by drying. Dried plants have lost volatile substances, particularly volatile oils. Chemical changes, too, have been produced by plants remaining in contact with air. Since the first step in the chemical analysis of the plant is to treat it with petroleum spirit, and as cold maceration requires a good deal of time for complete extraction, time is actually saved by thus keeping the plant.

I am not proposing petroleum spirit as a preservative entirely on my own experience. An experienced chemist to whom I spoke thought it would be excellent. After beginning the analysis of different plants, he had several times been interrupted and obliged to keep them in petroleum spirit for a year at least. If kept in the dark he invariably found them in good condition.

Dried plants are not fit for microscopic study, even if their chemical constituents are unaltered. Their cells are contracted and they break so readily that sections are not conveniently made. Therefore plants must be kept in a liquid. Ordinary alcohol removes too many constituents and renders the plants too brittle. In a measure the same is true of absolute alcohol. Moreover absolute alcohol absorbs water so rapidly that it is troublesome, and it is too expensive. Since Dr. H. W. Jayne, of Frankfort, Philadelphia, has undertaken the manufacture of petroleum spirit it is easily obtained and does not cost a great deal. Ordinarily it removes only a little chlorophyll and volatile and fixed oils. If these constituents are to be especially studied, the previous macro chemical examination would show in what they were insoluble and the plants preserved in these. My experience has been that petroleum spirit does not contract the plant or render it brittle, as does alcohol. Since petroleum spirit does not remove water, I should think this would be true in most cases.

The rapidity of evaporation of petroleum spirit is objectionable because of waste and the danger of fire. But rapidity of evaporation is not always disadvantageous. One can thus easily free the object from petroleum spirit if it is desired to mount in something else.—LILLIE J. MARTIN.

[Histologists will notice that Miss Martin does not claim that petroleum spirit is a suitable preservative for tissues for histological examination. Cell-walls are admirably preserved by it, but the structure of the cell contents is not well shown. The liquid is so volatile as to make the handling of sections almost impossible. Nor does the petroleum spirit harden specimens suitably for section cutting. We call attention to these points lest some one may be disappointed by hoping to preserve histological material by this liquid.—EDS.]

EDITORIAL.

IN THE December number of the *American Naturalist* (p. 1075), occurs the following, portions of which we italicize: "The species of *tree moss, Ursea barbata*, grows to a considerable length on the south shore of Lake Superior. * * * The *moss* trails from the limbs *a la the parasitic* Spanish moss of the South." This item of "scientific news" occurs in the department under that name edited by Wm. Hosea Ballou. Just why there should be such a department in addition to the others edited by specialists, and embracing almost all branches of natural history, we can not see. The editor of this department can not be a specialist, and is therefore constantly liable to bring discredit upon the *Naturalist's* good name, by the insertion of items like the above, which savors of the style of the daily newspaper. Had this note come under the eyes of the editor of the department of botany, Dr. Bessey, it would of course have appeared in a correct form. We respectfully suggest to the editors of the *Naturalist* that they have the department of "scientific news" edited by the various specialists on their staff, and not left to the tender mercies of any special news gatherer.

IT MAY not be too late, at least for its own sake, for the GAZETTE to express its opinion on the "Hatch bill," which is pending before Congress. The bill provides for the establishment of agricultural experiment stations in connection with the agricultural colleges established under the act of 1862 in the various states and territories, or hereafter established under that act. The trustees of these colleges have entire charge of such stations, and are required to appoint a director and necessary assistants:

"It shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals, the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation within the isothermal limits represented by the climate of the several stations and their vicinity; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states and territories."

In order to secure uniformity of methods and results these stations are to receive advice and assistance from the Commissioner of Agriculture (though not under his control in any way), and are to report their work annually, in addition to issuing quarterly bulletins of progress. For carrying out the provisions of this act, $15,000 annually is appropriated to each station.

No more useful legislation has ever been proposed in the United States, and the benefits accruing to the agricultural industry and botanical science, from the establishment of such stations, would be incalculable. The provision for original research and the prompt publication of results is a most commendable feature, and the bill is worthy of the heartiest support. Immense pressure has been brought to bear upon Congress, and the friends of the bill confidently expect its passage. In this hope the GAZETTE earnestly joins.

NOTES AND NEWS.

DR. GOEBEL, of Rostock, will succeed the late Dr. Wigand at Marburg.

DR. S. A. T. TUELBERG, a Scandinavian botanist, died December 15, 34 years of age.

MR. A. H. CURTISS is editor of the *Florida Farmer and Fruit Grower*, published at Jacksonville, Fla.

RUDOLF VON UECHTRITZ, chiefly known for his studies of the Silesian flora, died November 21 last, at 48 years of age.

DR. A. F. W. SCHIMPER, formerly connected with the Johns Hopkins University, has just returned to Bonn from a journey in Brazil.

MR. WILLIAM FAWCETT, of the Botanical Department, British Museum, has been appointed Director of the Jamaica Botanical Gardens.

DON FRANCISCO LOSCOS Y BERNAL, a Spanish botanist who did much to make known the flora of his region, died November, 1886, at the age of 63.

A STUDY of the microbe of rabbit septicæmia by Dr. T. Smith has been distributed by the author from the *Journal of Comparative Medicine and Surgery*.

THE ENUMERATION of North American Hypocreaceæ by Ellis and Everhart comes to a close in the January *Journal of Mycology* with the 161st number.

MR. J. H. HART, superintendent of the Government Cinchona plantation (Jamaica), has been appointed superintendent of the Trinidad Botanic Garden.

DR. TSCHIRCH recommends the addition of lead or barium compounds to the alcohol used in preserving plants as an efficient method of retaining the original colors.

FATHER SCORTECHINI, a well known Indian botanist, recently died at Calcutta. His death was induced by severe work in the botanical exploration of Perak.

DURING the last ten years between 1100 and 1200 new plants from Madagascar have been described in the *Journal of the Linnean Society* and *Journal of Botany*. Twenty nine of these are new genera.

THE EDITORS of *Notarisia* desire to compile a directory of all writers and investigators who give attention to algæ. Such will please send their addresses to Messrs. De Toni and Levi, 3422 S. Samuele, Venice, Italy.

AT THE CHRISTMAS meeting of the Indiana Academy of Sciences, at Indianapolis, Dr. H. W. Wiley presented a valuable paper on the "Causes of the Variation of Sucrose in Sorghum," of which we shall publish an abstract shortly.

AS THE APPROPRIATION bill before Congress now reads, the work of plant pathology of the Agricultural Department will receive about $5,000 for carrying on the next year's work, exclusive of salaries. But it may yet be cut down.

A SHORT ACCOUNT of the life and work of Dr. Georg Winter, editor of *Hedwigia*, from the pen of Prof. W. A. Kellerman, is given in the *Journal of Mycology* for January. A full list of his publications, forty-three in number, is appended.

TRUFFLES of edible size have finally been found in the United States. They come from Louisiana, and have been identified by Mr. J. B. Ellis as Tuber niveum (*Terfezia leonis* Tul.). It is reported quite common near Natchitoches, and is eaten by the residents.

HUGO DE VRIES suggests, in *Nature*, a method of preserving such colorless plants as Monotropa in alcohol without their assuming a brown color. "To 100 parts of common strong alcohol add 2 parts of the ordinary concentrated solution of hydrochloric acid of the shops."

ON COMPARING the reprint of Röll's *Zur Systematik der Torfmoose* with the original in *Flora* we find that the paging has been so completely altered as to make it impracticable to state at length the changes. It is greatly to be regretted that such confusing changes should be introduced into important papers.

A. J. BROWN declares that the membrane commonly known as "mother of vinegar" is formed by Bacterium xylinum, n. sp., and not by Bacterium aceti, to which it has been ascribed. The membrane gives all the reactions of cellulose, which the bacterium forms from the dextrose and other sugars present.

THAT BOTANY is a suitable, and even very desirable study for young men is the conclusion reached by Dr. J. F. A. Adams in an article in the *Swiss Cross*, the new journal of natural history for the Agassiz Association, published in connection with *Science*. He has the botany of the plant collector chiefly in mind.

A NEW JOURNAL, *Agricultural Science*, has started with the year, which will doubtless contain more or less matter of interest to botanists. It is edited by Charles S. Plumb, of Geneva, N. Y., and is a monthly of twenty-four pages, rated at two dollars per annum. It presents an excellent appearance, and has articles in the first number by well-known scientists.

PROF. BAYLEY BALFOUR, in *Nature* for Dec. 9 (1886), confirms George Kleb's easy demonstration "that algæ make the water in which they live alkaline when they are fixing carbon in light. A watery solution of phenolphtalein is added, and in proportion as the fixation of carbon proceeds the water gradually assumes a deep red tinge, which gradually disappears when light is excluded."

DR. E. KLEIN, in *Nature* (December 23), calls the Cambridge cholera fungus (of Messrs. Roy, Brown and Sherrington) to account, and says it is a common mold which has developed during preserving of the material, and has grown from the free surface into the tissues, and has no connection with Asiatic cholera. His criticisms indicate a surprising lack of care in the work of the gentlemen referred to.

THE RESULTS attained by Mr. Roland Thaxter in the cultivation of Roestelia from spores of Gymnosporangium, which have already been partly described in this journal by Dr. Farlow, are given in detail in Proceedings of the American Academy, recently issued. In addition to what has already been said, it is noted that G. macropus, the common cedar-apple, is joined with R. pyrata, an American form of R. penicillata.

WE REGRET to record the death of Marshall P. Wilder, Dec. 17, in his eighty-ninth year, for many years president of the Am. Pomological Society, and so well known to all plant cultivators. The *Gardener's Chronicle* (Jan. 1), in an appreciative notice of his services, gives a characteristic extract from his last letter to them, dated March last, in which he mentions himself as "still living, and continuing to stir up the soil to see what it will produce."

IN THE *Journal of Botany* (January), Drs. De Toni and Voglino call attention to the vexation of homonymous genera. No remedy is suggested for existing confusion, but caution suggested in subsequent naming. For instance, Antennaria is a genus of Compositæ and Hyphomyceteæ, Chauvinia is a member of Chlorophyceæ and Gramineæ, Cryptodiscus is a Discomycete and an Umbellifer, Leptotrichum is a Hyphomycete and a moss, and so on.

AT A RECENT meeting of the Cambridge (England) Philosophical Society, Mr. Walter Gardiner gave an account of the gland-bearing organs found in Hodgsonia. Studying the gland-bearing genera of Cucurbitaceæ and Passifloraceæ, he concludes that the function of the extra floral nectaries of these two families is to attract certain insects (probably ants), which are of service in protecting the plant from the attacks of other and harmful insects, such as caterpillars.

THE LIBRARY of Kew has just come into possession of the rarest and most valuable Japanese botanical work, the Honzo Dsufu, by Iwasatti Tsanemasa. It contains colored figures of 1500 species, and is in 96 volumes, the first 6 of which only have ever been printed, the rest existing in hand-made copies, and only two or three copies are known to be complete. This magnificent work was presented to Kew by Mr. Tokutaro Ito, now a student of botany in the University of Cambridge.

DR. AITCHISON, of the Afghan Delimitation Commission, has made a collection of about 800 species (10,000 specimens) of the plants of that region. The collection has not been fully worked out yet, but it is estimated to contain about 100 new species. A curious Umbellifer (Ferula oopoda) is described, "in which the bases of the cauline leaves are developed into large circular bowls, through a succession of which, gradually smaller upwards, the stem passes. The largest of these bowls are a foot in diameter, and about two quarts in capacity." Dr. Aitchison thinks these bowls do not serve as reservoirs of water.

AT A RECENT meeting of the Linnean Society, Mr. C. T. Druery described a new instance of apospory in Polystichum angulare, var. pulcherrimum. A paper on apospory was also read by Prof. F. O. Bower, in the course of which he showed how in Polystichum at least four different modes of the origin of the oophyte may be distinguished, two being in connection with the sorus, while two are at points apart from the sorus, and may occur even on fronds which bear no sori at all. In considering the whole phenomenon of apospory Prof. Bower came to the conclusion that it is to be regarded rather as a sport than a reversion bearing deep morphological conclusions with it.

THE BIENNIAL REPORT of the University of Nebraska shows that a remarkable growth has taken place in its scientific departments under the leadership of Dr. Bessey. For botany, with which we are most concerned, there are five rooms required, now provided with an outfit of many compound and simple microscopes, a library especially valuable in serial works, over twenty-three thousand specimens in the herbarium, and other useful and illustrative material. The standard of scholarship has been considerably raised during these two years.

DR. G. HABERLANDT, investigating the structure of stinging hairs of various families, finds their essential structure very similar. Usually there is a large terminal cell, more or less sunk in a multicellular base by which it is attached. A short distance below the point the walls of the terminal cell are very brittle, made so either by the deposit of mineral substances or by lignification. The substance which produces the irritation is not yet known. Formic acid, to which the urtication has been ascribed, he thinks will not produce the effects in the small quantity in which it is present.

THE first number of a new journal devoted to animal and vegetable parasites has been received. It is entitled *Centralblatt für Bacteriologie und Parasitenkunde*, and is edited by Dr. Uhlworm, of Cassel, Germany, assisted by Drs. Leuckart and Loeffler, and a very long list of promised contributors. Dr. Sternberg, of Johns Hopkins University, will represent the editor in this country. It is a bi-weekly of the size and appearance of the *Botanisches Centralblatt*, and promises to be in its field an equally useful journal. It will at least be indispensable for bacteriologists. The price per year is 28 marks ($7).

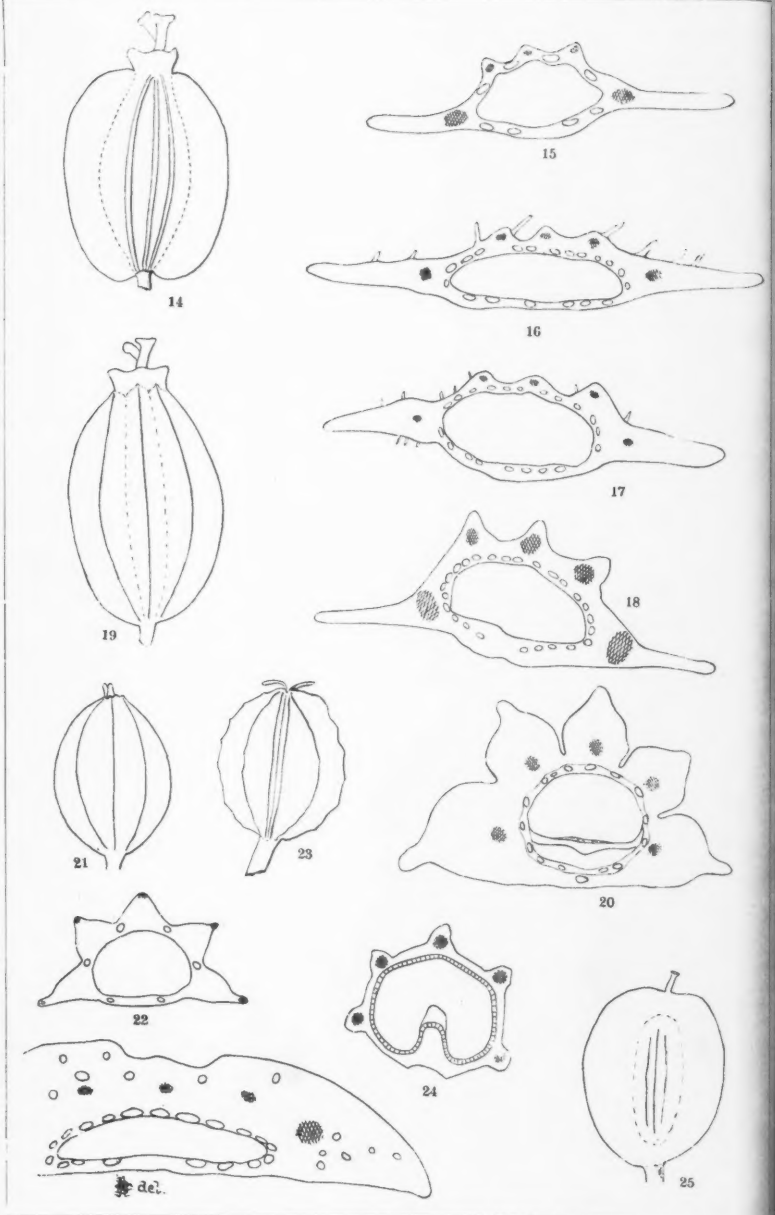
A SIMPLE METHOD of detecting ptomaines at the time of their formation has been devised by Alexander Poehl, according to Biedermann's *Centralblatt*. A needle culture is made in nutritive gelatine [kept in the dark presumably], to which has been added .05 per cent. of ferric chloride, and the same of ferricyanide. In twelve hours the organisms will have grown sufficiently to bring about a reduction, if any ptomaine is formed, giving rise to Prussian blue, which will at once be evident by its color. The presence of air prevents the change taking place at or near the surface of the gelatine. For organisms which require an alkaline medium, the culture must be acidulated with hydrochloric acid after the lapse of sufficient time for the growth of the bacteria, in order to bring out the blue color in the presence of a ptomaine. An interesting result of the studies already made is that the forms which liquefy the gelatine are found to induce no reduction.

IN *Nature* for December 16 (1886), D. Morris gives two interesting instances of the dispersion of Jamaican plants by birds. Uncinia Jamaicensis has light fruits bristling with hooks very favorable for grasping the migratory birds. Small birds have been known to become so entangled by them that they were unable to extricate themselves. As a result this plant is dispersed plentifully in the track of migratory birds. Pimento vulgaris, which gives rise to the great allspice industry of Jamaica, is distributed by frugiverous birds, by whom the fruit is greedily eaten. In fact, it is said that this industry is entirely dependent upon the action of frugivorous birds. Ground is prepared for a new pimento plantation, and in a year an abundance of young pimento plants will be found growing from ripe berries scattered there by birds. It is thought that the seeds undergo some fermentation in passing through the alimentary canal, which fits them better for vegetation than those gathered immediately from the tree.

THE RELATION of nutrition to sexual variation, advocated by Meehan, Hoffmann and others, appears to have been observed long ago. F. W. Burbridge calls attention, in the *Gardeners' Chronicle*, to a statement in Threkeld's "Synopsis Stirpium Hibernicarum," published in Dublin in 1727, which says: "The male hemp has the seed, the female only flowers, yet both are procreated from the same seed. The more attentive husbandmen observe that in a fat soil you have more plenty of male hemp—in a lean soil more of the female; or where sown too thick, and so wants nutritious juice, it is female." Transposing the words "male" and "female" to accord with present usage, and the account agrees with recent investigations.

FUNGUS DISEASES of the grape-vine is the topic of the second bulletin of the Botanical Division of the Department of Agriculture, prepared by F. L. Scribner. It contains 136 pages, illustrated with seven excellent plates, partly colored, and with cuts in the text. The diseases described are the downy mildew (Peronospora viticola), powdery mildew (Uncinula spiralis), black rot (Physalospora Bidwellii), anthracnose (Sphaceloma ampelinum), leaf blight (Cercospora viticola) and leaf spot (Phyllosticta Labruscæ). These are carefully discussed, both botanically and practically. An article by Col. Pearson, of New Jersey, is appended, together with a translation of several articles on French and Italian remedies. A copious index closes a paper which does credit to the Department, and will be of service to both the botanist and vineyardist.

THE *Journal of Botany* for January contains a biographical sketch (with portrait) of the late Dr. H. F. Hance, prepared by F. B. Forbes. Dr. Hance was born August 4, 1827, in London, and died at Amoy (where he was acting consul) June 22, 1886. His name is closely identified with Chinese botany, and his contributions, of late years, in the *Journal of Botany*, have made his name familiar to all botanists. Sir Joseph Hooker gives th following estimate of his scientific work: "With regard to Dr. Hance's botanical attainments and the value of his labors, I can speak in very high terms. For upwards of 40 years he devoted all his spare time to investigating the vegetation of China, displaying rare ability in mastering the technicalities of structural and descriptive botany, at times enriching the scientific journals in England with accounts of new plants of great interest in a botanical and economic point of view. In all that he attempted he aimed at critical accuracy in identification and diagnosis, and this he attained in an eminent degree, so that there is no possibility of failure in recognizing from his descriptions the plants he had under examination. Had Dr. Hance lived he would doubtless have given in a connected form an account of the vegetable riches of China, such as it would have been far beyond the grasp of any other naturalist to have produced, and this, too, with a classical diction that is extremely rare in the writings of scientific men. As it is, he has left no successor in China."



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